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A MANUAL
OF
RATIONAL BEE-KEEPING

C. DE RIBEAUCOURT.





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July 1st, 1879.



Frankston

A MANUAL
OF
RATIONAL BEE-KEEPING.

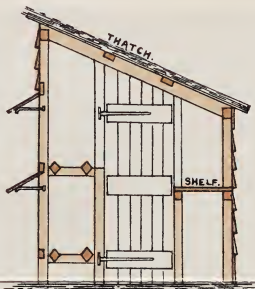


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BEE,
HOUSE.

- SCALE -

1/4 IN TO A FOOT.



— SECTION. —



— ELEVATION. —



— PLAN. —

A MANUAL
OF
RATIONAL BEE-KEEPING.

BY
C. DE RIBEAUCOURT,

PASTEUR OF ARZIER, SWITZERLAND,
AND PRESIDENT OF THE SOCIÉTÉ D'APICULTURE DE LA SUISSE ROMANDE.

TRANSLATED FROM THE FRENCH BY
ARTHUR F. G. LEVESON GOWER,

MEMBER OF THE SOCIÉTÉ D'APICULTURE DE LA SUISSE ROMANDE, AND OF
THE BRITISH BEE-KEEPERS' ASSOCIATION.



London:
DAVID BOGUE,
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1879.

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TRANSLATOR'S PREFACE.



DURING a visit which I paid to M. de Ribeaucourt in the autumn of 1876, I was much struck by the simple and practical method which he has applied to the management of his bees, and which he has moreover extended to the poorer inhabitants in the neighbourhood of Arzier, by inducing them to modify the old system of bee culture by the adoption of the cheap and excellent bee-hive which he has introduced amongst them.

A cheap and strong hive, on improved principles, is, I feel sure, much wanted in England, in order to promote an improved system of bee-keeping amongst our cottagers; but until a

General

working man can see clearly that the plan which he is asked to adopt is the cheapest,

as well as the most practical, it cannot be expected that he will fall in with it. These qualifications, however, once proved, there is more chance of his abandoning his old prejudices (which on this subject are generally deeply rooted) in favour of a new system.

M. de Ribeaucourt's hive seems in every respect to supply the above want. His system of bee-keeping, together with a full description of this hive, are given in the little Manual which he has published, and which, for its simplicity and practical bearing on the subject of which it treats, has been widely circulated throughout French Switzerland. It is with great diffidence that I am now undertaking to translate this Manual into English, as I feel sure that much of the force of the original will be lost or weakened by passing through my hands, and that it would receive far better treatment from a more experienced French scholar, and from one better acquainted than I am with bees and with the technical terms connected with bee-keeping. As the author, however, expressed a wish that I should undertake the translation, I have done so to the best of my power, hoping that those into whose hands it may fall will

not criticise the English rendering too severely, and that if they are French scholars they will turn to the original,* in which the author's meaning will be found expressed far more clearly and more concisely than in this translation.

A. L. G.

* "Manuel d'Apiculture Rationnelle," par C. de Ribeaucourt. J. Sandoz, Neufchâtel.

INTRODUCTION.



ON BEE-KEEPING IN FRENCH SWITZERLAND.

FRENCH Switzerland appears to us to possess all the requirements necessary and, in fact, indispensable for successful bee-keeping; nevertheless, in passing through the various cantons of which it is composed, we have experienced a feeling of regret at the sight of a considerable number of apiaries in a bad state, or even sometimes abandoned altogether.

The last three years, in which the seasons have been, for the most part, bad ones, the number of gaps has been increased; and it is only by following out a rational system, that some few bee-masters have preserved the number of their insect colonies unimpaired.

Although all the different districts of our country are not equally favourable for producing honey, still we may affirm that, by paying great attention to the bees, a return three or four times as large as that generally obtained might be insured.

The country contains a large amount of meadow-land, natural and artificial, and all kinds of fruit-trees ; in addition to which, the forests and the undulating nature of the land, not to mention the mountains, furnish great resources for our winged insects.

It is true that, in the plains or in the low-lying ground away from the mountains, the supply of honey might be considerably increased by moving the bees to the hills after haymaking, as by this means the bee-master would secure two gatherings of honey ; but at the foot of the Jura, and the first slope of the Alps, this removal is not of the same importance, for the bees in these localities profit by the flora of the plain as well as of the mountains.

Our country, far from supplying enough honey for its wants, is forced to procure it from elsewhere ; and there is, perhaps, no country where there is a larger consumption of honey than in our own cantons.

It would, no doubt, be desirable that the run-honey, which we get from some German cantons, should be free from all adulteration; and that in our hotels the landlords should no longer supply, as honey, a chemical production which is honey in appearance only.

It is, therefore, of the highest importance to endeavour to better the condition of the apiaries, and to establish new ones in places which offer every security for their prosperity. It is with a view to this that we have published the following little treatise. May it receive at the hands of the public in our cantons, a reception equal to that which was accorded to our first edition.

C. DE RIBEAUCOURT.

Arzier, Canton de Vaud.

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ON RATIONAL BEE-KEEPING.



CHAPTER I.

ON RATIONAL BEE-KEEPING.

WHAT is meant by rational bee-keeping ?

Some people imagine that by this term the selection of one kind of hive is meant, to the exclusion of all others. This is not our idea of its meaning.

According to us, rational bee-keeping means the culture of bees conducted with intelligence by employing all the simplest and easiest methods for obtaining the best supply of honey, having an eye, at the same time, to the preservation and increase of the colonies.

No system of apiculture can be called rational which does not allow the bee-master to develop the knowledge he possesses, and to profit by that which he has acquired, in order to keep

his colonies in good condition, with the least possible trouble, and at the same time to increase, according to his wants, the produce of his apiary, either in honey or in swarms. If, in our little manual, we have spoken only of apiculture generally, contenting ourselves with that kind of hive which we have ourselves adopted, it is because we were as yet unacquainted with all the different systems of hives in use throughout Europe and America; and even had we been acquainted with them, we should still have preferred to recommend rational bee-keeping with a simple and cheap hive, rather than to review systems of hives which seem hardly practical, and the high price of which puts them out of the reach of the public in general.

We admit that rational bee-keeping can be carried on with all systems of hives; this, no doubt, the fixists, Messrs. Collin and Hamet, French bee-masters, will allow also; but to conclude from hence that we ought to keep to the use of hives on the old principle, which offer no facilities for the management of bees, and reject those with moveable bars, because they have not yet come into general use, would certainly not be rational. For our part,

we know for a fact that all who have tried the moveable bar system must have appreciated its advantages. In apiculture, facility of manipulation is of the greatest importance, as the want of skill produced by the fear of being stung often prevents a bee-keeper from giving his bees, at the right moment, the attention they require.

We will give a few examples in support of our assertion.

A bee-master may be fully aware that combs which have been perforated by the bees to extract the larvæ of the moth, as well as combs which have become hardened by age, are of no use for the young brood; but being in the middle of hives made on the old principle and occupied by bees, he will hesitate to remove them, because, by making use of an instrument to cut out the defective parts, he will run a risk of destroying the workers, and possibly even the queen herself.

If this operation be undertaken in winter, additional cold is introduced into the hive by the vacuum which is created; and if delayed till the spring (seeing that these defective combs often contain brood as early as February), it may be a

matter of doubt whether it is advisable to remove them ; so that thus, owing to the construction of the old hives, the operation is delayed until the evil is past remedy.

In the case of a hive like ours, with moveable bars, if there be no fresh comb in good condition to replace that which is spoilt, that fit for breeding purposes may be replaced in the middle of the hive, and the defective comb at the sides, together with the drone comb, until the bees are in full work, at which time it can be removed without the possibility of harm being done to the colony.* Now, it is extremely difficult, not to say impossible, to perform this operation with the old-fashioned hives.

If we wish to make sure that a hive on the old principle contains a queen, or if we want to introduce a new queen, it is necessary to have recourse to temporary suffocation, and often to spend much time in searching for the queen amongst thousands of motionless bees ; whilst by taking up our moveable bars in succession, beginning with those on which there are most bees, the queen is immediately at our disposal.

* The drone comb may also be used for the storing of honey.

To this fact some members who attended my lectures at Lausanne, or those I gave in the cantons of Geneva, Vaud, and Neufchâtel, are able to bear witness.

In order to make an artificial swarm, it is simply necessary to fix a piece of comb, containing brood at different stages of maturity, to the top of an ordinary hive, and to put this hive in the place of a strong colony, of which a large portion of the bees are abroad at work.*

Bees can also be induced to go into an empty hive by means of "drumming," or, to speak in plainer language, by rapping the full hive sharply with a couple of sticks, or the hands, until the bees are driven out. The author of a work on bees remarks, however, that if no result is obtained after an hour and a half by these means, the operation should be recommenced on the following day. Our readers will see as we do, that this latter method can only be employed by those who have time to waste, and, moreover, presents many difficulties.†

It is clear, however, that by taking out some

* Method pointed out, long ago, by M. de Géliu.

† There is very little difficulty in expelling bees from a stock by "driving," if properly performed.—*Trans.*

portions of the moveable comb when filled with brood, and placing them in a similar hive, or by separating two hives when both the upper and lower are full of comb and brood, the operation takes a much shorter time, is far simpler, and, moreover, is much more certain to succeed.

If we want to remove brood from an ordinary hive into another similar one, no doubt it can be done, but the difficulty consists in fixing the comb in the hive; whereas, with moveable bars, we simply put it into its place.

If we wish to make certain that there is brood in an ordinary hive, it is frequently impossible to do so, especially if it be not sealed over; whereas, with our system of hive, nothing is easier.

Lastly, if we want to remove the bees with their combs from a common skep into another hive, the operation is tedious and difficult; whereas, with hives made on our plan, it can be accomplished with ease in ten minutes.

If we were to review all the operations which may take place in an apiary in the course of the year, the ease and rapidity with which each may be done would always be enhanced by making use of hives with moveable bars; and notwith-

standing the assertions to the contrary of those who favour the old system, rational apiculture will gain by adopting the new.

The German hives of Dzierzon, Berlepsch, Blatt, etc., have not the advantage of supers of any kind, whereas our hives can be used with supers of any shape or size.

Would it, then, be best to convert all old-fashioned hives into hives with moveable bars, by transferring the comb with the bees from the former into the latter, as has been done by some young, but by no means inexperienced bee-masters? We think not. There are in our own apiary old-fashioned hives which we have no intention of so converting. These hives will be useful to us, as they have been up to the present time, for the purpose of making artificial swarms, by placing under each of them, in the spring, a hive with moveable bars.

When the upper and the lower stories are filled with bees and comb containing brood, the straw hive may be conveyed to another part of the bee-garden and our swarm is made; nor does this prevent us, after the operation is completed, from placing a fresh hive under each of these hives respectively, or upon each of them a super, as we think best.

As we said before, we admit that rational bee-keeping may be carried on with every kind of hive ; but the system which we have adopted offers a more certain return, and a facility for carrying out each operation, which the best kind of hive on the old principle does not afford. We think it well, therefore, to repeat what we said in a conversation we had with M. Bastian, when discussing the meeting at Weinfeld : “ Hives on the old principle, though not all presenting the same drawbacks, remain as a sealed book for the bee-master, whereas hives with moveable bars are like a book with its pages open. With these latter he will learn more in a year than he would in a lifetime with the former.”

CHAPTER II.

ON THE PROSPERITY AND DECLINE OF AN
APIARY CONDUCTED ON THE OLD SYSTEM,
AND THE MEANS OF REMEDYING DEFECTS
IN THAT SYSTEM.

IN speaking of bees, there is a French proverb, "On a vite beaucoup et vite peu;" that is to say, that the prosperity of an apiary closely precedes its ruin. This we can easily understand, seeing, as we do, the way in which bee-keeping is carried on in many localities. To begin with, a swarm in good condition will give one or two swarms the following year; thus, for a certain time, an apiary of from fifteen to twenty hives will be kept well stocked. For some years the swarms are sold. There comes a bad year—there are no swarms; the hives get old, swarming ceases, and mortality soon makes a clean sweep of this apiary, hitherto in prosperous condition.

If a swarm issues from a straw hive, the colony whence it issued keeps diminishing, because the space allotted to the brood decreases gradually, even in the most prosperous years.

The space left is diminished still further by a second swarm ; and since the new queen, as yet unimpregnated, cannot make use of the empty cells for depositing her eggs, the bees fill these cells with honey, and the colony which has produced two swarms is often fated to perish during the following winter, although amply supplied with provisions.

According to the system which we are about to explain, by means of artificial swarming the strength of the colonies is largely increased, seeing that the space allotted to the comb is always in proportion to the wants of the bees.

Artificial swarming has also this advantage over natural swarming, that it does not require daily supervision and consequent loss of time ; for when a natural swarm leaves the hive, it is often lost, even after having been hived ; and at other times, in spite, apparently, of the most favourable circumstances, no swarm issues forth at all, whereas by artificial swarms these contingencies can be guarded against.

CHAPTER III.

ON THE BEE-HOUSE SIMPLIFIED.

IT is generally known that bee-houses should be exposed as much as possible to the ten-o'clock sun, and, at the same time, be sheltered from the north wind. It is known also that a bee-house should be suitable for the system of hives which it is proposed to adopt. Now, in the bee-house which we recommend, and in which we have taken pains to unite all the advantages of each system in use throughout French Switzerland,* the space between each row of hives should be sufficient to allow three hives to be placed one above the other, each being about six inches in height, in addition to which two inches must be allowed for the floor and crown boards,

* See frontispiece.

making a total in all of twenty inches ; or, allowing a little margin, we may say two and a half feet. Calculating that the lowest row of hives is at a distance of about a foot from the ground, we get three and a half feet from the ground to the rails which support the second row.

Three of our hives, placed one above the other on these rails, require an additional height of two and a half feet. These measurements added together amount to six feet, which seems to us high enough for our bee-house.*

It is of importance that the drip from the roof should be at the back, and that the roof or thatching should project about a foot on each side of the bee-house.

The opening to a small bee-house can be made either from the back or at the sides, according to the depth from back to front. It is indispensable that draughts should be excluded on all sides.

When the bee-house is built of planks, we recommend that the planks at the back and sides should run in a groove formed by two

* In the frontispiece the height in front is shown as seven feet, which will be found necessary if the house is thatched.

fillets, or strips, of wood nailed to the joists at the top and bottom, so that in dry weather, especially in winter and spring, the boards may be tightened by means of a wedge inserted between them at one end.*

Such a bee-house as this can be constructed at a small cost. During very hot weather, it is a good plan to give ventilation during the day.

We now pass on to the different systems of hives in use ; after which, we shall describe that kind of hive which we have adopted, and which has been of service to us in the various experiments we have made.

* In the frontispiece weather-boarding is shown, instead of this method.

CHAPTER IV.

ON VARIOUS SYSTEMS OF HIVES.

IF we were to attempt to describe every system of hive, we should have to compile a whole volume on the subject ; and this, it should be understood, neither time nor the compass of our Manual allows.

Nevertheless, as we were reproached for having, on a former occasion, ignored the different systems which exist in France, Germany, and elsewhere, and for dealing solely with our own, we think it right to supply this deficiency, if such deficiency there has been.

Bees prosper in every kind of hive : the fissure of a rock well exposed to the sun, a hollow tree, a hole in a wall, a space between a window and closed shutters, etc., suffices for the construction of their combs, for breeding

purposes, and for storing honey. But from the moment they are placed under man's management, he should provide habitations to shelter them from the inclemency of the weather and for facilitating all operations connected with them. In other words, man, as a rational being, should carry on bee-keeping in a rational way.

In hot countries a simple wicker basket, a barrel staved in, or an old box has satisfied the wants of bee-keepers. But the difficulty of managing the bees, and the fear of being stung, have often induced them to have recourse to suffocation in order to obtain the honey. Now, however, the system of suffocation is only resorted to by those who do not make use of hives with moveable bars.

In French Switzerland, the common hive has been in use from time immemorial, and supers were employed as long ago as the last century, though a good many old-fashioned people with whom we are acquainted, do not yet make use of them. They limit themselves to hiving their swarms when they do not escape, and to cutting honey out of their hives, or to destroying the bees in the heaviest hives in order to get possession of it.

The straw hive, on the old plan, which does not generally contain more than from fifteen to eighteen pounds, is too small. In moderate or bad years, the colonies cannot, in the spring, provide against all their wants; and their owner, calculating on a supply of honey, which the unfavourable weather prevents the bees from collecting, sees them perishing from hunger, and not from cold as is generally supposed.

This is proved by hundreds and, at times, even thousands of bees being found with their heads inserted in the cells, not having had the strength to withdraw them.

Some bee-masters have an idea that straw hives are warmer than wooden ones, and that they possess the advantage of absorbing the moisture which collects on the sides. Now, it is clear to any careful observer that dampness collects as much on the sides of a straw hive as on those of a wooden one, and that during a hard frost the inner surface of each may be covered with a thin layer of ice without any apparent detriment to the bees, since they are protected by the internal warmth of the colony. Besides which, the straw hive gets by degrees waterproof, the sides, by the end of a year, becoming covered with propolis.

construct a special cell round it, in the shape of an acorn, either beneath or on the sides of the comb. They only complete this cell in proportion as the larva is developed, and only seal it up when the larva is about to become a queen, by passing through the state of chrysalis or nymph. From the beginning of the work until the hatching of the queen eleven to fifteen days may elapse, depending on whether the queen is produced from a newly deposited egg, or from one which has been deposited two, three, or four days ; in the latter case the egg will have passed already into the condition of larva.

The difference between the queen and the worker consists in the fact that, although of the same sex, the large size of her cell and the difference of her food cause her to come to perfection as a queen in sixteen days, whereas worker bees take twenty-one days to arrive at their imperfect state of development.

We say imperfect as to sex, for workers do at times lay eggs, when left without a queen ; but these eggs only produce drones, because, owing to their construction, the workers cannot be fertilized.

As to the court which, according to some authors, is paid to the queen, it is purely imaginary. In the hive, she is mistress of her movements; and the bees only surround and press upon her when she is in some danger, or when she is dead. It would seem, in the latter case, as if they made every effort to bring her back to life.

THE DRONE, OR MALE BEE.

The drone has no sting, and is large and thickly made. The size of his head and body is larger than that of the queen or the worker bee.



The drone is the produce of an unfertilized egg. If details are wanted on this point, as on many others which cannot be given in a small popular manual, they may be found in the treatise on Rational Bee-Keeping by M. Bastian, of Wissenbourg.

The drone may be distinguished from the worker bee by the loud buzzing which he makes on leaving the hive. A single drone

is sufficient to fertilize the queen. In the hives of common bees, it is a good plan to remove the drone comb, so as to diminish the number of drones if possible ; but it sometimes happens that the bees reconstruct, in the same place, combs of the same kind. The safest way would be to replace the drone comb with worker comb, which can be easily done by those who make use of the extractor.

In the case of Italian bees, it is better to leave the drone comb alone, because the more Italians there are, the greater the chance of the common queens being fertilized by them. A common queen thus fertilized produces a cross breed which is more productive than the pure Italian.

It is true that, while the drones are in the hive, they consume a large quantity of the honey collected by the workers ; but still, we have not noticed that those hives which hold most drones, provided the queen prospers, yield less than those which contain fewer of these gluttons ; for, though they do consume a great deal of food in the hive, they create considerable warmth, a circumstance which enables a greater quantity of bees to go out in search of honey.

THE WORKER BEE.

It is a well-known fact that the worker bee is a female, as we have said already ; and that, in the case of the queen's disappearance, some of the workers deposit eggs in the cells, which come



to perfection, but which only produce drones ; so that every hive which only contains workers, and no queen, must necessarily perish. The worker bee

takes twenty-one days to pass through the stages of egg, larva, and nymph, and arrive at maturity. In a few days after leaving her cell, she goes out to collect honey, and takes her share in the work of the hive.

The worker bee is so called because she alone works at the construction of the comb, collects the honey, provides food for the brood, keeps the hive free from anything obnoxious, and defends the colony from all internal and external enemies.

As to the supposed equal division of all this labour in a hive, we cannot admit such to be a fact.

I. Because the bees who come home laden

with pollen and honey often mount guard, and by a constant beating of their wings help to purify the air of the hive.

2. In artificial swarms it is a remarkable fact that, on the days following the removal of the upper story of the hive, which is then placed at some distance from its previous position, all the bees in the hive work at the development of the brood ; and it is not until after the hatching takes place, and the colony is thus reinforced, that the work out of doors recommences.

3. If there were bees exclusively employed in working the wax, during a great part of the spring there would be no work for them in a hive well stocked with comb—a fact which cannot be allowed, knowing their zeal and immense activity.

4. Lastly, worker bees are all formed so as to fulfil all these functions ; and it is worth notice that certain hives, in summer, after receiving a great number of bees laden with pollen in the morning, receive hardly any in the afternoon, and even at what is considered to be the best gathering time, very few bees are loaded with pollen. Still, we allow that the young bees are exclusively occupied with the internal work of

the hive for the first few days after they leave the cells, a fact which is easily proved with a hive of common bees into which an Italian queen has been introduced. I should add that all the bees belonging to the same hive know each other, and if a stranger tries to enter their hive they will oppose it, and, if needs be, a pitched battle will take place. Nevertheless, if the strangers are laden with honey, they are generally welcomed.

It is for this reason that at gathering time the hives can be moved about. A weak hive may be put in the place of a strong one, and *vice versâ*, the work of the hives proceeding without any combat taking place.

Both worker bee and queen possess a sting, although the latter have seldom been known to make use of it.

Bee-masters have pointed out various specifics against the sting of bees. Some advise that the wound be opened with a penknife, and a drop of alkali inserted; others, a drop of alkali with carbolic acid, etc. As to ourselves, we have always advocated, after the removal of the sting, that cold water be employed, and the wound scratched at the same time with the nail, to remove the poison.

After having dried the wound, a small quantity of wax applied to it will stop the pain, and prevent swelling.*

* I have adopted this plan on various occasions, and have found it invariably successful.

CHAPTER VI.

ON THE CONTENTS OF THE HIVE.

HONEY.

HONEY is the liquid matter which the bee gathers by means of its proboscis or tongue, by plunging it into the calyx of the flower. As we shall show later on, honey is made use of in forming the wax destined for the construction of the comb ; but it is also used for feeding the bees, and for satisfying many different wants.

WAX.

Wax is the produce of a secretion from honey. Duchet, chaplain at the castle of Remauffens, in the canton of Fribourg, was the first to prove this fact, and to demonstrate it clearly, more than a hundred years ago, in opposition to the theory of Réaumur.

It is maintained that this secretion takes place by means of the rings of the abdomen ; but from observations which we have made while the bees have been constructing their comb, we have always observed that they work with their tongue or proboscis, and with their mandibles.*

Wax is a substance secreted from honey ; although certain bee-masters have erroneously maintained, and still do maintain, that pollen is unwrought wax, or at least the substance which becomes so by the operation of the bees. Wax is made use of in building combs, composed of small hexagonal cells, destined according to their size to the rearing of the different kinds of bees which exist in a hive, and later on, with the exception of those appropriated to the queens, for the storing of honey or pollen.

POLLEN.

Pollen is the seminal dust which is found on the stamen of the flower, and which the worker

* Wax, when secreted, exudes in thin lammæ from the wax-pockets situate in the abdomen, and is then manipulated by the mandibles.—*Trans.*

bees collect as they flit from one flower to another. They are sometimes covered with this dust when they return to the hive. As a rule they carry it, when collected, in a small cavity in their hind legs, to which the name of pollen-basket has been given, as we mentioned above. They use it mixed with honey to feed the young, and mixed with wax to seal up the cells when the young have been brought to perfection.

Pollen, if stored in the combs in too large quantities, deteriorates in the winter under the influence of the damp; but when preserved in good condition, the bees use it as early as January and February, for feeding the young. It is necessary, therefore, to ascertain in the spring and autumn whether the weight of a hive is caused by the honey which it contains, or by too large an accumulation of pollen. In the latter case, the bee-master may possibly see his colony die of hunger, imagining all the time that it is amply provided for. It is only by removing the comb that this fact can be ascertained.

PROPOLIS.

Propolis is a sticky substance like resin. It is gathered from certain trees, and is made use of by the bees for closing up all the small crevices in the interior of their hive, and for fixing the hive to the floor-board, so as effectually to bar the entrance against any enemy from without.

CHAPTER VII.

HOW TO TEST THE TRUE VALUE OF A HIVE.

IT is of the greatest importance in establishing an apiary to make sure of the value of the hives which are going to be placed there.

Mistaken directions are often given on this head in works on bees.

A hive may be very heavy and contain a considerable colony of bees in February, though destined to perish soon afterwards. Never mind about the weight of the hive, therefore; but make sure—

1. That there be sufficient store of food to last till the flowers come out.

2. That the colony be numerous and the bees lively.

3. That the comb be in good condition; and, *above all, be sure that the cells contain brood in the midst of the cluster of bees at the end of February*

or beginning of March. Unless the latter is the case, the former conditions are valueless.

In any case a hive full of bees and of moderate weight in March is worth more than a very heavy hive with few bees.

As to the best time for buying stocks of bees, in our climate we are inclined to recommend the month of March, unless the seller will guarantee them in good condition until the middle of April.

Swarms can also be purchased at the swarming season; but in bad years, being unable to fill their hive, they run a chance of dying in the winter unless they are fed.

Hives can be moved at any season of the year; but during great heat this should only be done at night, care being taken to ventilate the hive throughout, without allowing any exit for the bees. Unless this is done, the great heat produced by the confinement of the bees might cause the comb to fall.

Any sudden shock may bring about a similar accident, and, if a carriage is used, precaution must be taken to avoid any jolting.

CHAPTER VIII.

ON NATURAL SWARMS.

SWARM is the name given to a certain number of bees who leave the parent hive, or are taken out of it to form a new colony.

The first kind of swarm is called a natural swarm. When a natural swarm is about to issue from the hive, the hive from which it proceeds is filled with bees, who are generally in a state of great agitation, owing to the internal warmth. A swarm may issue from a hive without showing any previous sign by which the bee-master can foresee that the event is likely to take place. Sometimes the swarm issues from a hive round which the bees have been hanging in clusters for several days; sometimes from one well filled with bees, but before which no bee is to be seen in a state of inactivity.

At other times a swarm will proceed from a hive the bees of which have already filled a super ; at others, again, from one on which a super has been placed, but which does not contain even the smallest piece of comb, so that none of the signs which have been laid down as predicting a swarm can be depended upon.

Moreover, even when a swarm is on the point of issuing from the hive, it is often prevented by the appearance of a few clouds or a storm, by a strong wind from the south or from the north, by a few drops of rain ; any sudden change, in fact, in the temperature or the atmosphere will prevent a swarm from leaving the hive. It is therefore necessary, if the system of natural swarms is adhered to, that a continual watch be kept from early in May till the end of June, depending on the part of the country in which the hives are situated. The watch must be kept from nine o'clock in the morning till three in the afternoon ; moreover, this great loss of time takes place when every hand is wanted in the country, and sometimes even this watching will prove fruitless.

It occasionally happens that after a swarm

has issued from a hive, it returns to it again. This may occur from two different causes; either from the queen returning of her own accord, or from her being lost and the bees being unable to find her.

A natural swarm is composed of the queen-mother who comes from the original hive, of worker bees, and of males or drones.

When a swarm has just issued from a hive, in order to make it settle, some dust or sand should be thrown into the midst of the bees; or, what is better, some water should be sprinkled amongst them by means of a broom. This will cause the bees to cluster, either on some branch of a tree or shrub, or else against the trunk of a tree, sometimes at the foot of a wall, and sometimes even on the ground.

In order to hive the bees when in this condition, take a very clean hive; rub its inner surface with mint or thyme, or if either of these should not be at hand, with the leaves of a plum tree. Place your hive below the bees, and give the branch a smart tap in order to make them fall into the hive if possible. Cover the hive up immediately with the floor-board and turn it over. Then insert between the hive and its

floor-board some small wooden wedges, in order to facilitate the entrance of the bees.

If the bees are on the ground, place your hive over them on two laths of wood, taking care not to crush them ; they will then go up into the hive. If they are against the trunk of a tree or a wall, they must be made to fall into the hive by using a broom in the way we have described above. When once the queen is in the hive, the bees will beat a retreat, and all those of the same swarm will unite together. If not, the operation must be recommenced.

When the bees of a swarm are nearly all massed together in one spot, they must be hived before the evening ; for, if not, there is a risk of losing them altogether, since it often happens that, after searching about for a suitable spot, they will go off again at the moment you least expect it. Sometimes even, notwithstanding all precautions, it is impossible to keep the bees in a hive at all, although they may have been hived several times.

If the weather be bad, it is advisable to give the bees some food for a few days after hiving the swarm.

We are of opinion, however, that natural

swarming should be discouraged, not only on account of the loss of time which it occasions, but also because of the difficulties incident on the hiving of swarms; in a word, because the hopes of the bee-master are too often disappointed by keeping to this system.

CHAPTER IX.

ON ARTIFICIAL SWARMS.

SWARMS BY DIVISION.

IN order to make an artificial swarm from an old hive in which natural swarming has ceased, and with greater reason from a hive in good condition, it is only necessary to *place the old hive on the top of one of our hives, without any board between the two.* Care should be taken to smear the corners of the wooden hive and the projecting parts of the straw hive with mortar.

In every case, it is necessary that all crevices should be carefully closed up, the best kind of plaster for doing this being a mixture made of a third part of lime and two thirds of cow-dung ; but it is necessary that the plaster should be thick, and also it ought not to be allowed to

penetrate unnecessarily into the corners of the wooden hive, or into the interior of the projecting part of the straw hive.

The bees will hasten to fill the lower hive. As soon as they have done so, remove the straw hive, turn it over with care, and after having scraped off the plaster which clings to the sides, make sure that the combs contain brood, and moreover brood which is not more than three days old. Unless this is the case the bees will not be able to make a queen. Place this hive on a floor-board, at some distance from the lower hive, which remains in its old place. Your swarm will thus be made; for in whichever of the two hives there is no queen, the bees will hasten to construct a good number of royal cells, and at the end of from eleven to fifteen days, the division, which before had no queen, will now be provided with one.

As the bees of the hive, or rather compartment, which has been removed to a distance, will not gather any honey for several days, or work in any manner away from home, they should be provided with some water in a small wooden trough for three or four days. This trough should be put under a super placed on

the hive, and the entrance of the hive should be diminished.

If, instead of a straw skep, there happen to be two wooden hives placed one above the other, when both are filled—always supposing that the top one has from the first contained the colony, with their combs—the two hives must be divided in the way pointed out above, and the swarm is made. You can, at will, leave either the upper or lower compartment in the place which the hive originally occupied. Moreover, as your hive is already stocked with honey, there is no danger of the swarm being unable to provide for itself.

SWARMS BY DISPLACING.

A second method of multiplying swarms, in a good year, consists in taking one or more combs full of brood at different stages of maturity, and in placing them in an empty hive, together with the bars on which they are built. Remove a well-filled hive at about eleven o'clock in the morning, on a fine day, in the second fortnight in May, if in the plain, or at a distance from the mountains; or, up to

the second fortnight in June, if near the mountains. Put in its place your hive with one or more combs containing brood, either with bees or without ; the bees which are out gathering honey, coming back from the country, will fill your empty hive, they will hasten to construct royal cells, and your swarm will be made.

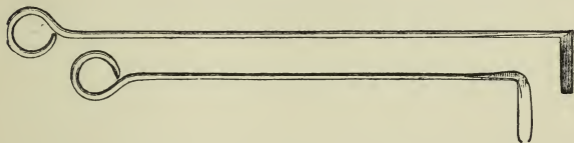
The removal of the strong hive of bees for this purpose will not prevent us, if the season is favourable, from making an artificial swarm a fortnight afterwards in the way previously indicated.

The second method pointed out presents great advantages for the multiplying of Italian bees ; for combs which contain Italian brood or eggs produce Italian queens, and at the end of two months the common bees will have disappeared, and will have been replaced by Italians.

In three years I have obtained, with a single Italian queen, twenty swarms, either of pure Italians or mongrels.

For the purpose of removing the comb, it is best to have a small hooked knife, with two blades, which is inserted from the top of the hive, and used by sliding it along, either from the top of the hive to the bottom, or *vice versâ*,

either along the glass or along the sides of the hive, as the case may be. The parts of the comb adhering to the hive being thus detached,



the comb itself may easily be removed from above; and, when removed, it can be placed in any empty hive at hand.

It is well in this, as in all other operations in which it is necessary to come in contact with the bees, to puff some tobacco smoke into the hive before beginning operations. This may be done, either by means of an ordinary pipe, or with a pipe specially appropriated to this use. A kind of tinder, made into a cord the thickness of the finger, may be also used for this purpose with great advantage. This is introduced into the hive by means of a tube of tin riveted together, but the tinder must first be steeped in a solution of water and saltpetre, and afterwards allowed to dry. By keeping this cord hung up in the bee-house, a means of smoking the bees when necessary is always at hand for the bee-master's use.

After having made an artificial swarm by division, one or more combs containing royal cells, sealed up, may be removed at the end of ten days ; and you will thus have queens in the new swarm at the end of five days at most. It is possible, also, to cut out a royal cell containing an Italian queen before she is hatched, and to place it in a hive in which there is no queen.

In this manner a hive of black bees can be converted into a hive of Italians. It is quite clear that the above-mentioned cells can only be found in the hives where the queen no longer remains.

According to the system of division, two facts will become evident.

1. In that part of the hive which remains in its original position, the bees will continue to work with activity ; they will even increase so rapidly that it may be necessary to place a second hive underneath, which they will sometimes fill in ten days or a fortnight.

2. As to the compartment of the hive which has been removed, the bees will not leave it for some days ; they will also decrease in numbers, seeing that a certain number will return to the original hive.

But the brood, nursed by those bees which remain in the hive, will increase greatly; the cells which were filled with honey will be emptied by the bees, and the queen will deposite her eggs in them, which in a short time will produce a strong stock.

By following out this plan, I obtained in 1869, from eight hives, sixteen swarms and a produce amounting to 200 lbs. of honey. In 1870, although a very bad year, swarms being scarce, sixteen hives gave me twenty-eight swarms, with a produce of 100 lbs. of honey. The third year, I increased the number of my hives to thirty-two, of which twenty were Ligurians, and the produce in honey amounted to 200 lbs. weight.

We have said that our system unites simplicity of management with economy of time. We are able to make an artificial swarm by division in ten minutes; and are able, moreover, to do so at any time of the day or even of the night.

Besides the advantages afforded by our hives, which have been mentioned above, we may add the following:—

1. In the height of summer, when the bees

are in full work, combs filled with honey may be taken from the sides of our hive.

2. Combs filled with brood may be taken from any strong hives, and may be moved into weaker ones, which need strengthening.

3. If a hive is in bad condition, it is easy to ascertain by taking out the bars, one by one, with the bees on them, whether there is a queen in the hive or not.

In the latter case, if there is no brood in the hive dating from the end of March, some comb containing brood at different stages of maturity must be introduced without delay. If this is done, the preservation of the hive will be insured.

It is true that several bee-masters pretend that the queen cannot be replaced, but our experience proves the contrary ; nevertheless, we must allow that we have never been able to introduce a queen into a hive which was producing only drones, without having first taken advantage of some fine afternoon to brush out all the bees at a short distance from the beehouse ; the bees will then return to a hive put in the place of their original one, and will receive a new queen gladly.

4. In the case of the bees of a hive losing their queen in the winter, the colony may be preserved, comb and all, by placing the hive either above or below another one in good condition; care, however, being first taken to sprinkle a small quantity of run honey or syrup over the bees, blowing in, at the same time, a puff or two of tobacco smoke. By taking these precautions, all fighting will usually be avoided. The uniting of stocks should always take place at nightfall.

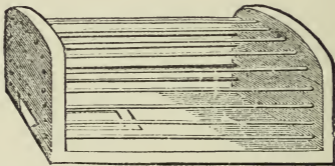
5. If a hive or any portion of a hive is filled with comb, but contains no bees, the best plan is to remove it, when the spring comes, and place it under a hive in good condition; the bees will then hasten to take advantage of it.

6. When a hive contains several combs in bad condition, whether full of honey or not, they can be removed; new comb, if it is at hand, being substituted. In any case, the bees will always make new comb in the place of that which has been removed.

7. It is possible at every season of the year to remove all the comb from one hive into another. Thus, an easy method is always at hand for ascertaining whether the queen is in the hive

or not; and if deemed advisable, she can be removed and replaced by another queen.

8. If we wish to Italianize a stock of black bees, the hive must be cleared by removing the combs with the bees on them, and placing the bees, combs and all, in an empty hive, in the same order as in the original one. The black queen must be removed, and the combs replaced in the hive from which they were first taken.



After having left the bees for one day without a queen, the Italian queen may be introduced in a small wire cage provided for the purpose, a puff of smoke being blown into the hive at the same time.

After having been left for at least one day in this cage, and not before, let the queen be liberated, and, generally, she will be gladly received by the whole colony. I have, however, had the misfortune, while performing this operation, to lose three queens out of six.

9. The capacity of our hive, or rather of one division of it, is the same as that of a good-sized straw hive of ordinary make, and when well filled contains enough to provide for the wants of a strong colony during the whole winter.

10. The advantage of a system of hive with bars, to which the comb may be attached, consists in the fact that the comb can be easily removed at any season of the year. As the bars of each hive are fastened down to its upper part by a piece of wire which can be removed at will, the bars of the lower hive form a flooring for the upper, from which the few particles of wax which adhere from the comb of the upper hive can be easily detached.

11. Our system, in a word, taking it altogether, gives an opportunity to a schoolmaster, or to any other person who has not all his time at his disposal, for taking an interest in bee-keeping, without experiencing any anxiety, even although he may live at some distance from his bee-garden. As an instance of this, although my bee-garden was for some years at a distance of about a mile from my own house, I found no difficulty in looking after the wants of my colonies when they required attention.

CHAPTER X.

HONEY FROM SUPERS.

WE mentioned in the first edition of this Manual that we were glad to think that the barbarous system of stifling bees had completely died out in this locality.

We were in error in making this assertion. Ignorance and prejudice have still kept up the system in several localities; but those apiaries in which suffocation is practised are in bad condition, and in a short time the bee-masters to whom they belong will no longer have it in their power to carry on this insane practice, which amounts to working out the ruin of their own possessions.

As a rule, with the idea of having the supers well filled, the fixists put on such as are too small for the requirements of the hive. After having filled them, the bees hang about the entrance

of the hive during the time which is most favourable for gathering.

The bee-master thinks it is his duty to wait for the issue of a swarm which, after all, never leaves the hive, and he thus loses all the honey which the bees would have collected during this time, and which would have been worth quite as much to him as a swarm. I have sometimes placed supers or wooden hives of the capacity of from 30 to 32 lbs. of honey over straw hives, and these supers have been filled in a fortnight or three weeks, whilst the bees of those hives on which I had placed a super of the capacity of 8 or 10 lbs. only, were losing their time, and remaining inactive for want of space to store their honey.

We therefore advise our readers, unless they are desirous of making artificial swarms, not to be afraid of placing hives with moveable bars of the capacity of about 30 lbs. over strong hives, for, as a general rule, the bees will fill them.

This result may easily be obtained in a tolerably good honey season, at the foot of the Jura and the Alps, and even in fertile plains near the woods.

In order to drive the bees from a super,

reverse it, and place an empty hive over the full one ; tap gently on the latter, and the bees will move up into the empty hive, which must then be placed on the stock.

If the bees will not move up, it is a sure proof that the queen bee is in the super containing the honey, in which case the operation must be deferred.

CHAPTER XI.

ENEMIES OF BEES.

OF all the bee's enemies, the most hurtful is the moth.

This insect introduces itself into the hive at dusk, and deposits its eggs, which, under the influence of warmth, are hatched and produce worms or caterpillars. These develop themselves with great rapidity, and bring ruin to the hive they infest.



This caterpillar, at first very small and thin, envelops itself in a network or cocoon of silk, at the same time perforating the comb. It feeds on the pollen, and attains a considerable size, being about an inch in length. When once it has made its appearance, the bees can only remove

it by cutting away the comb all round, pulverizing it, and carrying it out of the hive.

This causes the holes that may be observed in the comb. Sometimes these holes are so numerous, especially in old hives, that the combs are divided up into small pieces, and consequently unfit for rearing the young. In order to get rid of these moths, or at least to diminish their quantity, care must be taken that no old comb be left about the bee-house, whether in old hives or other places, where the moth can deposit its eggs. If, however, these combs are hung up, and exposed to the air, without touching, they will remain unharmed. The best plan is to remove the combs and put them in some place where they are sheltered from the attacks of this insect—in a tub, for instance, under which some sulphur has been burnt. Care must also be taken, whenever the bee-house is visited during the day, to kill any moths that may be found in or about the hives. No crevice should be left in which any eggs can be deposited.

When a hive is fairly attacked by moth, it becomes absolutely necessary to remove all the parts infested. We have seen some hives, which

were so attacked, entirely freed from this insect by the means indicated.

The floor-board should also be carefully cleaned or changed, in order to insure its being perfectly free from moth. If, however, the comb be very seriously attacked, so that the colony is observed to diminish visibly, it is probable that the queen is dead.

In this case, the only course will be to unite the bees to those of another hive, taking care to sprinkle them with honey or syrup, finishing up with a good puff of smoke.

2. Mice.—In order to avoid the introduction of mice into the hives, care must be taken to diminish the size of the entrance during the winter, in the way mentioned above ; for a hive taken possession of by mice in winter may possibly not only be damaged, but even entirely destroyed.

3. The death's-head moth is also very partial to honey. We have seen it enter a hive full of bees, and come out again after having well refreshed itself at the expense of the bees and their master. We have also found some inside the hives, who had paid dearly for their audacity by their lives.

We do not know any specific against the ravages of this insect ; for, at the time it makes its inroads, it is impossible so to diminish the entrance of the hive as absolutely to prevent its attacks. Moreover, it never causes the destruction of a colony.

4. As to birds, we have never remarked that they in any way hurt the bees when in the hive, and there is no means of preventing them from catching the bees, as they sometimes do, when the latter leave the hive in search of honey.

We put aside the question of lizards, toads, and other insects which rarely make their appearance. They do not cause so much harm as some bee-masters maintain.

5. As to ants, the best way to get rid of them is to place the floor-boards of the hives on a shelf formed by the upper angles of two squared joists running parallel to each other, from end to end of the bee-house, and so to plaster the hives all round that there is no possibility of their introducing themselves except by the usual entrance.

They may also be crushed—this being perhaps the best way of scaring those who may come after ; or they may be destroyed by

fly-paper pounded in honey and water, and placed in the ground, covered up in such a way that the bees cannot get at it. The ants will go to it from all quarters and meet their death there.

6. Lastly, spiders trouble the bees by spinning their webs in all directions. They should be carefully destroyed, and the bee-house should be kept in a state of perfect cleanliness.

CHAPTER XII.

DISEASES OF BEES—DEATH OF THE QUEEN—
STEPS TO BE TAKEN IN THE LATTER CASE.

AS we have mentioned before, bees are sometimes attacked with dysentery, both in winter and spring. It has been maintained that the cause of this complaint is the scarcity of pollen. This, however, is a mistake, seeing that many hives which contain plenty of pollen are thus attacked. It is really caused by the internal dampness of a hive, or by vitiated atmosphere.

We have remarked that the best means of avoiding this complaint is to ventilate the hive, and we will add that it is important that the bees should be allowed free exit at all times. They should also be fed with syrup made from sugar and common French wine. This, however, should only be given in the spring, for in winter

it will tempt them from their hive, and many may thus be lost.

As to the parasites which sometimes attach themselves to the thorax of the bee, we cannot tell what causes them. We have noticed them not only in old hives in bad condition, to which their presence is attributed by some bee-masters, but also amongst fresh swarms and in new hives.*

In any case, there is no need to feel any anxiety with regard to this insect, as long as the hive is in good condition.

Insect powders, which are so much recommended, are only, to my mind, useful for persons who have plenty of time to waste.

Sometimes, towards the month of May, bees are subject to small excrescences on their heads, like little fleshy horns, of the colour of pollen. We have never been able to prove that these

* In August, 1876, on examining one of my hives, I found the queen covered with these parasites, there being no less than seventy on her body and head. I removed them, and replaced her in the hive. She appeared to be in perfect health, and the same hive is this year in a most flourishing condition.

N.B.—It appears as if the bees, when once attacked, are unable to free themselves from these insects, either by their own exertions or by the help of their companions.

growths constitute a disease, and they invariably disappear by the end of July.

As to foul brood, we have never had an opportunity of testing this disease, for which no remedy is known. Dzierzon communicated it to his apiary by feeding the bees with strange honey, and lost in one year 360 hives.

Lastly, want of judicious feeding brings destruction every year to a great number of hives—a hint to be taken by stingy or negligent bee-masters.

The greatest misfortune that can happen to a hive is the loss of the queen bee. As soon as she dies, the bees of the hive become extremely disconcerted, and the whole colony is in commotion. This state of things, after lasting for a day or two, is followed by the most complete *demoralization*. There is much noise in the interior of the hive, yet few bees go out to gather honey; and whilst other colonies are bringing in abundant provisions, the hive which has been deprived of its queen falls into a kind of bewilderment. If there is no brood left, from which a queen may be reared, the hive is very soon taken possession of by robber bees, and given up to pillage; and even if this does not

happen, the mortality amongst these insects is so great, that during the summer, the strongest and most prosperous hive will be completely depopulated in less than a month.

Excepting in the winter, the season when the bees leave the hive but little, the average life of a worker does not exceed six weeks. It ought not, therefore, to be a matter of astonishment that a single queen bee is reckoned to lay 50,000 eggs a year; for, taking into account the number of times the eggs are laid, and the number of cells in which they are deposited, a still higher figure will be reached.

As we have already said, if the loss of the queen takes place at a season when there are drones in the hives, or when drones are in process of being hatched, take a piece of comb containing brood at different stages of maturity, and having in it eggs not yet brought to perfection; place this in the hive and the colony will be preserved.

If, on the other hand, the loss of the queen takes place at a period when there is no brood in the hives, the only way to save the stock is by uniting it to another.

In order to effect this, a small quantity of syrup, or liquid honey, as we have indicated

above, should be poured over the bees of the queenless stock, which should then be placed on the top of a hive containing a queen, a puff of smoke being at the same time blown into the lower hive. By adopting this plan, the two colonies will become united without any fighting taking place.

If possible, at the time a queenless stock is being robbed, let it be noticed from which hive the robbers come, and let these two hives be joined together, always remembering to place the queenless hive on the top, and taking the precautions mentioned above.

CHAPTER XIII.

FOOD FOR BEES.

AS to food, if honey cannot be given, the best substitute is syrup, made either from brown sugar or pounded loaf sugar. Mix this with a sufficient quantity of water, and boil it for ten minutes. Make quite sure that the liquid is turned into syrup, by pouring a few drops into a cold plate.

This syrup is very good for the nourishment of bees, and even of the brood. We have at times fed bees with sugar on which cold water has been poured, so as to make it of the consistency of syrup ; but if the bees store this in their cells, it becomes rapidly crystallized, owing to the evaporation of the water ; and hence the disadvantage of this kind of food.

As to the mixture of half a glass of wine (or

vinegar) to each bottle of syrup, of which some bee-masters make use, we do not recommend it, except in the spring, when the bees have begun work.

The best plan to adopt for feeding is to pour the syrup into some empty comb, or else into a small wooden trough, an inch wide, the third of an inch deep, by four or five inches in length. This should be placed on the top of the hive, and covered with a super carefully closed on all sides, so that no robber may be able to effect an entrance. As a rule, it is always better to feed from the top of the hive; the bees then enjoy what is given them in peace.

In the case of bar hives, let the empty comb be removed and filled on each side.

Three bars of comb in one of our hives will absorb about two pints of syrup.

CHAPTER XIV.

CARE TO BE GIVEN TO BEES AT DIFFERENT SEASONS OF THE YEAR.

WHEN bees begin to leave their hives with the first warmth of spring, great care should be taken not in any way to hinder their egress, as at this time of the year they require to be in the open air, in order to get rid of the evacuations which would otherwise accumulate either on the floor-board or sides of the hives. Matters would become worse if they were confined against their will. Their excitement would become excessive, and the internal warmth would, by this very fact, increase the dampness deposited on the sides of the hive and on the combs. At their first exit, the bees would cover the exterior of the hives with a yellow excrement, and possibly some hives would perish from diarrhœa,

dysentery, or from other accompanying causes, such, for instance, as the death of the queen.

In winter the base of the hives should be raised in such a manner that there may be a free circulation of air, be it ever so little. Moreover, the colonies would be none the worse, and the comb would be preserved in better condition, if a slight ventilation were allowed in the upper part of the hives.

Care, however, must be taken that the opening made be too small to allow a bee to get through, otherwise the hive is liable to be exposed to robbers. It would be well, under these circumstances, to put some covering over the hive—old clothes, bits of carpet or cloth, or some such protection ; and when there is any brood in the hive, the top should be well closed, warmth being very necessary in order to bring the young to perfection.

Care must also be taken, at the beginning of spring as well as in the winter, to keep the entrance of the hive very narrow—about an inch wide, with height sufficient to allow a bee to pass under. By these means, if the hive is weak, but contains a queen, it will always be able to defend itself against robbers. These

entrances should be kept small, until it is noticed that the bees are returning to their hives loaded with honey, and in consequence require an opening both wider and higher, to enable them to carry on the work of their respective colonies.

At the height of the gathering season the internal warmth of a hive, especially when there is a numerous colony, is often so great* that the bees leave off working in the upper part, and thus lose valuable time. In this case, a second entrance should be opened from the lower hive; the work will then continue with great activity.

As soon as one hive or section of a hive is filled with bees, brood, and honey, place a second underneath; and when these two are filled, they may either be separated and an artificial swarm made, or else a third may be placed below them.

If the upper hive happens to be old, and it is thought best to take the honey, remove it as soon as it is full, and drain out the honey by means of the extractor. If, however, both the upper and lower hive are in good condition and that swarms are not an object, but rather the possession of virgin honey, place a third hive

* 113° Fahr.

above the other two. This will answer the purpose of a super, and the contents may be disposed of at the end of the season.

In placing supers on our hive, always leave on the crown-board, which should be provided with two slits cut to correspond with the spaces between the bars of the hive.

When robber bees attack a hive and meet with resistance from its occupants, all the hives in the apiary are at times in commotion; even the strongest are obliged to put themselves on the defensive. Sometimes also, the whole front of the hive will be covered with bees who come out to protect the entrance. When this takes place, do not hesitate to diminish the entrance of weak hives, which require all their strength for work both inside the hive and out. This is the only means of bringing about a successful defence.

When an artificial swarm has been made, *always diminish the entrance of the hive which has been removed*, and provide the bees with water placed in a super over the hive. If the former precaution be omitted, the bees, who are occupied exclusively with work inside the hive, might be attacked without having any means

of resistance. As soon, however, as the colony begins to go abroad again in search of honey, the entrance should be widened according to the wants of the hive.

When honey has been removed from a bar hive, care should be taken to fasten down the crown-board hermetically, and not to leave any pieces of honey about on the top, by which robber bees may be attracted.

If a super or a hive full of honey be taken, the stock hive should be carefully covered up, so that no strange bee can effect an entrance.

In order to induce the bees to leave a super full of honey, which has just been taken, place it in some isolated position where the bees are not likely to be attacked by cold; then rap on it sharply with the hand, and the bees will all return to the apiary.

If, however, they cannot be induced to leave by these means, the super should be replaced on the stock hive, for it is probable that, under these circumstances, the queen bee has remained in it. She should be allowed to go back into the stock hive, and the operation may be again repeated with every probability of a successful result. As soon as the bees have almost

all left the super, carry it into a room, and place it in front of a window partly open. Those bees which still remain in the super will soon fly out and join their companions.

As soon as the swarming and gathering seasons are over, the entrances to hives should be made smaller, as we have noticed before, in order to avoid the inroads of robber bees.

If a hive has lost its queen *in summer and before the disappearance of the drones*, and if it can be ascertained with certainty that the hive contains no more brood, take a piece of comb full of brood out of another hive, place it in the middle of the queenless hive, and in a fortnight a queen will be hatched out. Moreover, from the very moment of the introduction of the brood, the bees will resume the activity which they had lost for the time, unless indeed there already exists in the hive a queen who has not been impregnated early enough, and who only produces drones. In this case, the bees will not make new queens from the brood which has been introduced, and the hive will infallibly perish. If, however, the old queen be removed, they will immediately set to work to make royal cells over the eggs deposited in those of

workers. These new cells, together with the special food on which the brood is fed, will convert what would have been an ordinary worker bee into a queen.

If a worker bee begins to deposit eggs in the cells, which often happens in a hive where there is no queen, all the bees should be brushed into an empty hive at a distance of fifty paces from the bee-house. They will return to the hive which has been put in the place of the one which was removed, and will at once receive the queen presented to them, or will make a new queen if they are provided with brood not more than four days old.

If, in the autumn or spring, it is noticed that bees hitherto industrious have ceased from working, it is a sure sign that the queen is no longer there.

In this case, to prevent the robbing of the hive and the consequent loss of the colony, the weakest stock in which there is a queen should be placed either above or below the hive. The colony will then continue to work with redoubled vigour. We repeat, however, for the third time, that in a case of this kind it is necessary to sprinkle some honey or syrup over the bees in

the upper hive, and to blow a few puffs of smoke into the lower.

An operation of this kind should, as much as possible, be undertaken towards evening.

In winter, when all work in the hives has ceased, a small opening may safely be left in the top of the hives, in order to allow the escape of any exhalations from within. This should be more especially attended to when the ground is covered with snow, as it is often expedient at such a time to close the entrances altogether, in order to prevent the bees from leaving the hive and thereby perishing. This method of confinement, however, must be used with great moderation.

At the beginning of winter, we advise strongly that two, or even three, weak stocks should be joined together to make one strong one, care being taken to remove the queens from the comb before brushing the bees into the hive to which they are to be united.

By these means the fighting which would otherwise take place amongst the rival queens is avoided. If, at the same time, the bees are all sprinkled with syrup, and a puff or two of smoke blown amongst them, they will live together in

good harmony. It is advisable to effect this union at nightfall.

If, however, the bee-master is anxious to preserve hives in which neither honey nor bees abound, he should place them in a room. If the hive is one on improved principles, the empty comb should be taken out and filled with syrup poured into the cells. The comb should then be returned to the hive.

If the hive be made on the old principle, the syrup may either be poured into a small wooden trough, or else into some empty comb. This should be placed at the top of the hive, under a super or hive of some kind.

By adopting this method, we have preserved many weak stocks at a small cost compared to the value of the hive so treated.

The preservation of weak stocks may prove extremely useful in the spring; for even the most populous colonies are liable to lose their queens. In this case, the strongest hive may be preserved by joining it to a feeble stock in which the queen is in existence.

If your small stocks happen to be Ligurian, and the queen in a strong hive of black bees has died, by joining the small Italian swarm

to the large swarm of black bees, a strong hive of Italians will, in a short time, be the result, and from the hive thus formed, swarms may afterwards be made.* Italians, moreover, or a cross breed, are far more active than the black bees, and their produce is very nearly double.

In visiting hives, whether in autumn, during the second fortnight of October, or in spring, during the second fortnight of February, or the first fortnight of March, care should be taken not to abuse the right of possession by depriving the bees of too much honey ; for it is necessary that a hive, to be in good condition, should contain at least 20 lbs. of honey at the end of October—that is to say, in ordinary seasons. In the last three years, 1871, 1872, and 1873, this quantity has not been sufficient to provide for the wants of strong stocks.

If a hive is in good condition in the spring, and still contains honey, that only which is

* A swarm made in 1869, from a single piece of comb containing Italian brood, and put at eleven o'clock a.m. in the place of a hive of black bees, gave me in 1870 a fine swarm and 20 lbs. of honey. The same hive gave me in 1871 two strong swarms and 50 lbs. of honey. The swarm of 1870 produced 30 lbs. of honey.

absolutely superfluous should be taken, otherwise the existence of the hive may be endangered by bad weather during the latter part of that season.

When taking honey from the hives, it should be extracted from those combs which are in bad condition and unfit for the rearing of brood, whether perforated by the bees in order to remove the moth, or hardened by age, or attacked with mildew.

This latter contingency, however, should never occur, as mildew may always be prevented by adhering to the rules which have already been given above.

CHAPTER XV.

EXTRACTION OF THE HONEY—DESCRIPTION
OF THE EXTRACTOR.

THE most favourable time for depriving a hive of its honey is that at which the bees are able to replace it. This is also the time when honey is in its most liquid state, and when the warmth facilitates its separation from the comb by means of the extractor.

When you wish to take honey from a hive, after having removed the bees, choose that comb which has least pollen in it—a fact which can be ascertained by holding it up to the light; the comb must then be placed on a closely platted wicker-basket, or on a sieve, and the back of a knife or the finger should then be passed over on each side without crushing it. It should then be placed in the extractor, and the honey, which will flow into the jar

placed underneath to receive it, will be of the finest quality. With regard to comb containing pollen, pass the back of a knife along each side of it in the way mentioned above, taking care not to crush the pollen, and proceed as in the former case. Your honey will still be of a good quality, although inferior to the first.

Put what remains of the comb into some kind of jar, which must be placed in the oven after the bread has been taken out. The honey which will be obtained by these means, although of inferior quality, may be employed as food for weak hives during the winter.

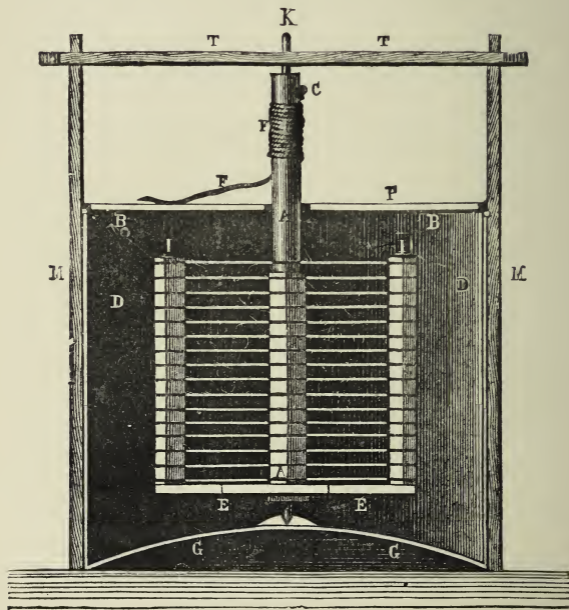
THE EXTRACTOR.

In order to separate the best of the honey from the comb, an extractor should be used. This method has the advantage of preserving the comb, which can afterwards be replaced in the hive, and, at the same time, of preventing the bitter taste of the pollen from being communicated to the honey.

The honey thus extracted from old comb, will be found to be of as good and fine a quality as that extracted from virgin comb.

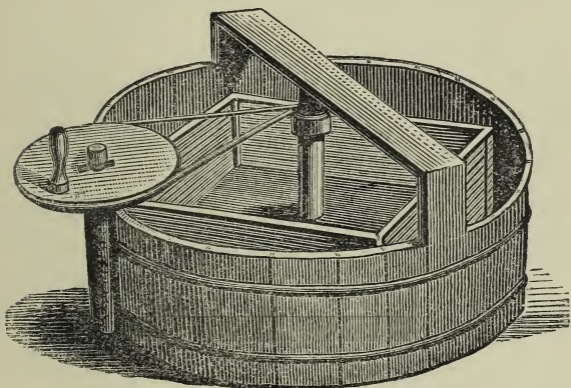
The Schmiedl extractor is the one we have invariably used, and it seems to us the best.

It is thus composed : (1) a tub for receiving the honey ; and (2) the extractor proper.



1. The tub, made of wood or zinc, should be about sixteen inches in height from the bottom to the upper rim, inside measurement.

The diameter at the top of the tub should be about twenty-six inches, spreading out to about thirty at its base. One of the staves of the tub, on each side of it, M M, should be allowed to project about eight inches above the upper rim. To the uprights thus formed a cross piece



should be attached, in the centre of which the upper axis of the extractor revolves, K.

The cross-bar above mentioned should be fixed to the uprights by means of an iron hook and eye at each end ; it can thus be removed and the extractor released at will.

The bottom of the tub should be convex, so as to facilitate the draining off of the honey.

It should also be provided with a tap, from which the honey may be drawn off into the jars in which it is intended to be kept.

2. The extractor ; composed of a board about eighteen inches square, and about an inch in thickness. At each corner of this board is fixed an upright, made of hard wood, an inch square, and eight inches in height, I.

These uprights should have the outer corners rounded, and should be fixed very firmly to the angles of the board. In the centre of this board there is a square wooden axis, A A, which passes through it to the distance of about an inch below.

This projecting piece is provided with a ferule, in the centre of which is a pin, revolving in a nut fixed in the centre of the tub.

This axis will be of the same height as the uprights on each side of the tub, M M ; and its upper part, K, being arranged in the same way as the lower, will be held firmly in its place by the cross-bar, T T, placed over the two uprights.

In order to keep the four uprights of the extractor in their proper position, bind them together at the top by means of four iron rods about three-quarters of an inch in thickness.

Round these uprights, from the top downwards, some thin, but strong, twine should be wound, a small space being allowed between each row. This string serves to hold the comb in its place, which otherwise would be thrown out by the centrifugal force; at the same time it allows sufficient space for the honey to pass through.

In order to keep this twine in its place, small pins should be driven into the uprights. They should be close to one another, and should project as little as possible from the woodwork.

Galvanized netting may be used as a substitute for the twine, and if this is nailed to the uprights, there will be no need to bind them together with the rods mentioned above. In the upper part of the axis, just below the cross-bar, there should be a groove, or fixed wheel, about three and a half inches in diameter.

On the edge of the tub, at an equal distance between the two uprights, a piece of wood should be solidly fixed, projecting about two inches above the rim. On this revolves a wheel about one foot in diameter, connected with the groove in the axis by a strong cord.

An upright handle is placed upon this wheel, at a distance of about two inches from the edge of it. By turning this handle the extractor is set in motion, and a considerable centrifugal force obtained, the honey being flung by the motion against the sides of the tub.

Two minutes will suffice for extracting the honey from one side of the comb, which should then be reversed, and the operation repeated.

The section of the extractor, page 90, shows an incomplete drawing; for this reason, we have placed opposite to it a front view of the extractor, page 91.

This latter, however, does not show the rods which bind together the four uprights, and serve to keep the comb in a vertical position.

Lastly, we should add that, before placing the comb in the extractor, the thin coating of wax



with which the honey is sealed, should be removed with a knife made for the purpose.*

* This knife, in form of a trowel, has a very thin blade, in width and length like an ordinary table-knife (see figure).

The comb, when emptied of the honey, can immediately be restored to the hives; the bees will thus find new storehouses ready for them, which they will hasten to fill afresh.

As to super honey which is to be kept in the comb, put it in a cool and dry place in the receptacle in which it has been made, and in the same position as when on the hive. By hermetically sealing every opening, the honey will be preserved till the spring without becoming candied.

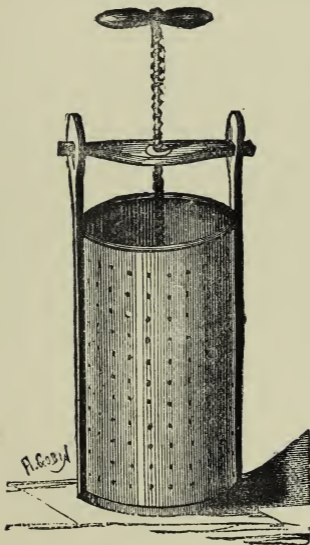
CHAPTER XVI.

ON THE MANUFACTURE OF WAX.

PUT some small, well-washed pebbles into a copper pot (for iron affects the colour of the wax), and place your comb in a bag made of fine canvas, tightly closed; put this into the copper pot filled with water, taking care that the bag be always immersed. Let it remain on a slow fire until it begins to simmer. The wax in melting will collect on the top. If there is still some pollen amongst it, warm it up gently a second time, and let it cool. The refuse, which will be found under the cake of wax, ought to be removed with a knife; the wax will then be in a fit state for the market. What remains should be melted up with some more wax on another occasion, so that none of the particles which it contains may be wasted.

ANOTHER METHOD.

After putting your comb in a sieve or in a wicker-basket placed on a vessel half full of water, put it in the oven after the bread has been taken out. The wax falling through into



the water will float on the top. This last method gives no trouble, but is less productive.

Lastly, in order to work on a large scale, it is

a good plan to make use of a press, which, when working, is placed in a vessel of boiling water, and kept up to a temperature of a hundred degrees.

The combs are placed in this machine and gradually pressed down. The wax rises to the top, and you then proceed in the same way as we have mentioned before. (See illustration on preceding page.)

CONCLUSION.

IN this Manual we have endeavoured to put bee-keeping within the reach of all, by recommending simpleness of management, and by leaving full liberty of action to the bee-master, who may be kept at a distance from a beegarden by the occupations of daily life.

If we have limited ourselves to giving information to our readers only on those points of which we are convinced by experience, the reason is that we have thought that a practical Manual should only contain notions within the reach of all, and practicable by all.

We hope to have accomplished this object, and to have clearly pointed out that any one who has a small place at his disposal, can take advantage of it for keeping bees with a profitable result; and by these means increase his

well-being, without in any way interfering with that of his fellow-creatures.

We shall be happy if we have obtained such a result, and if, moreover, we may be the means of persuading some bee-masters in our districts of the advantage to be derived from leaving the beaten track in which they persevere, either by remodelling their apiaries or by increasing them, and thus assuring to themselves a more certain produce, with an easier method of obtaining it.

Finally, we should be glad if we could induce young people to take an interest in bee-keeping. Independently of the produce which they might obtain, they would, no doubt, by observing in their leisure moments the habits and work of the bees, be astonished to find in their small communities such regularity of work, such internal order, such devotion, courage, far-sightedness, and wisdom, as characterize these insects. This study, like that of every study of nature, will raise their thoughts ; will procure for them pure delights ; and will, no doubt, bring them to admire and adore the wisdom of the Creator. They will, in fact, understand that the greatness of God, and His eternal wisdom, show

themselves in small things, even more clearly, perhaps, than in greater ones ; and they will be able to repeat with one of our best poets, and with an accent of conviction—

“ C’est dans un faible objet, imperceptible ouvrage,
Que l’art de l’ouvrier me frappe davantage.”

A P P E N D I X.



THE ITALIAN OR LIGURIAN BEE—ITS ADVANTAGES AND ACCLIMATIZATION.

Description of the Italian or Ligurian Bee—The manner of introducing strange Queens into a Hive, and hence of introducing Italian Queens—Means of preserving a pure Breed.

ITALIAN bees, called also Ligurians, are natives of countries on the other side of the Alps. These bees have the same organization as those found on this side of the Alps, with this difference only—that the two first rings of the abdomen are either of a yellowish brown or straw colour, depending on the locality.

They are also longer in the body than the bees of our country, and they have the great advantage, owing to the length of their tongue, of being able to gather honey from the calyx of flowers, to which the other bees cannot reach.

The Alps, with their eternal snows, have been a hindrance to the crossing of the breed, so that it is only in the last few years that they have been intro-

duced into Germany, France, and even into America. Dzierzon, the father of rational apiculture, contributed much to their introduction into Germany; and it seems that they are kept very generally in German Switzerland, to judge from the exhibition at Weinfelden, where, out of thirty or more stocks which were exhibited, two only consisted of ordinary bees.

A queen with a few bees, sent by post, during the months of March, April, May, or June, is sufficient to produce a pure-bred colony of Italians from which a cross with the common bees may easily be obtained. It often happens that, by means of crossing, a hive of common bees becomes completely Italianized; and if, as is sometimes the case, the Italian bees lose their colour, they nevertheless retain their characteristic properties.

Are these Italians preferable to the common bees?

This is a question which is often asked.

Although for many years German bee-keepers have with reason answered this question in the affirmative, some French bee-keepers, such as M. Hamet and more especially the Abbé Collin, considered it, only two years ago, a matter of doubt whether this is the case.

As to myself, I have already, on a former occasion, given my solution of the question. But seeing that such bee-masters as MM. Hamet and Collin have raised doubts on the point, I have thought it right to pursue my observations more carefully, and this has resulted in my pronouncing without any hesi-

tation in favour of the Italians. Nevertheless, the following circumstance is to their disadvantage—namely, that the queen mother of the pure Italian breed has a shorter term of life than a black queen or a queen of a mixed breed. This is an observation which I have often made, and in which several bee-masters in German Switzerland have concurred with me.

This may be attributed to the fact that the Italian queen is much more fertile than the ordinary queen; nevertheless, the Italian queen produced in our country has a longer life than the ordinary Italian. The same is the case with queens of a mixed breed. The latter have the advantage of being very fertile, and of producing large colonies in a short space of time—a circumstance which conduces to early and numerous swarming.

This has been by some considered a defect. It is, on the other hand, an immense advantage, seeing that the prosperity of a hive, as well as its produce, depends on the strength of the stock.

It is true that, by keeping to an unvarying system of small straw hives on the old principle, it is difficult to avoid the inconvenience of having a multiplicity of swarms; but in the case of hives with moveable bars, by increasing the capacity of the hive in good time, natural swarming is avoided to a great extent, and can be regulated at the will of the bee-master. In 1873 and 1874, I had hives of cross-bred Italian bees which in the month of June had only one story on

them. I then added three, making four stories in all. The three lower ones were filled, and the fourth already contained ten pounds of honey without a swarm having issued from the stock hive.

Independently of the productiveness of the queen, the prosperity of Italian colonies is attributable to other causes. I have already pointed out one; namely, the length of the tongue, which allows them to gather honey from flowers when other bees can get none.

Besides this, the Italian bee leaves the hive earlier in the morning than the common bee, and leaves off working later at night, in consequence of which the former is out at hours when the influence of the dew is felt—a circumstance which allows her to collect more honey.

Moreover, the Italian bee is more direct in her flight. The bees of the country fly about in front of the hive before entering it, whilst Italian or cross-bred bees enter immediately.

As to the calumnies which are circulated about this race, we are quite ready to endeavour to efface them, speaking from our own experience.

It is said that they rob their neighbours to a greater extent than the common bee! I must own, after many years' experience, that I have never known the robbing of a hive to be begun by Italian bees, but nearly always by the bees of the country; still, the contest once begun, the Italian bees, like all others of their species, take part in dividing the spoils. In return, they defend themselves against robber bees with greater vigour.

I have heard it said that they are more spiteful and less easy to manage than common bees. My experience has been quite the contrary. They are, it is true, more active and, above all, more sensitive to anything which interferes with them; but it is quite sufficient for the bee-master to blow a puff of smoke into the hive as a warning, in order to empty all the bees out of it, without having to defend himself against their stings.

To sum up: Italian bees are more beautiful, more fertile, more active, and consequently more productive than the common bees, and we cannot advise their culture too strongly. It is enough to introduce an Italian in the place of a common queen, and, either in the spring or summer, in the course of six weeks after her introduction, the hive will be entirely transformed.

In order to raise pure-bred Italian queens, notice should be taken the previous year which Italian colonies produce the finest drones. These should be strengthened, early in the spring, by the introduction of comb filled with worker brood taken from stocks of common bees. When these last become well populated with bees, which should be the case in April, introduce into each of them a piece of comb containing drone brood taken from the before chosen Italian stock. This plan will insure a large number of Italian drones by the end of the month, and earlier than those of the common variety. When these drones are on the point of being hatched out, artificial swarms, by division, should be made from these hives.

Whichever compartment contains no queen will shortly rear a great number. On the eleventh day after the division, remove all the combs containing royal cells, leaving two cells only on each piece of comb. Place each one of these in small hives, styled in England nucleus boxes, in which two pieces of comb containing brood have been fixed two days previously, with the bees which may have been attached to them.

When the Italian queen is at least two days old, the small hive, or nucleus box, should be removed for a day or two to a cellar or dark room, giving due care to insure ample ventilation. On the fourth day of the queen's existence, feed the bees with some syrup or liquid honey, and place them in the bee-house at nine o'clock in the morning. The drones and queens in these hives will take flight before the drones from the ordinary hives, and the queens, meeting only with Italian drones, will almost surely be fertilized by them.

As to the method of introducing Italian queens into a hive, it is necessary first to take away the existing queen, and leave the bees of that hive without a queen for two days. After destroying all the royal cells which are in process of formation, the new queen must be shut up in a wire cage and introduced into the hive in this manner, in order to accustom the bees to her presence. The following day, she can be set free, care being taken, however, to observe the attitude of the bees towards her. If she is attacked

and closely pressed by them, she must again be placed in the cage and not be set free till the following day. It is possible, instead of introducing a fertile queen, to place a royal cell at the top of the hive, between two rows of comb; I have often found this plan successful. I may add that it is an easy matter, and by no means an expensive one, to obtain Italian queens direct from Italy. They are sent over in boxes at a very reasonable price, and if an accident happens on their way, compensation is made for such loss.*

* In May the Italian queens are from eight to nine francs each, and postage extra; in September, five francs. They may be obtained from M. Mona, apiculteur, Tessin, Suisse, or from M. Celestino Spinédi, à Mendrizio Tessin.

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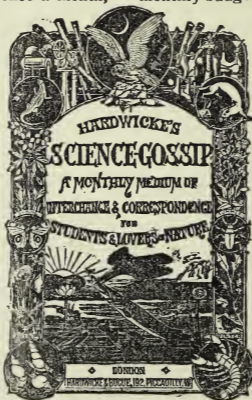
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